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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of — Atty. Docket

GEERT F.G. DEPOVERE ET AL. — PHN 17,772

Serial No.: 09/716,907 — Group Art Unit: 2131

Filed: November 20, 2000 — Examiner: A. Sherkat

Title: WATERMARK EMBEDDING AND DETECTING

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Enclosed is an original copy of an Appeal Brief in the above-identified patent application.

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Respectfully submitted,

By _____
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ART UNIT 2131

SERIAL NO. 09/716,907

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Sir:

APPEAL BRIEF

This is an appeal from the Examiner of Group 2131 finally rejecting claims 1-3, 5-7, 9 and 10 in this application.

(i) Real Party in Interest

The real party in interest in this application is U.S. PHILIPS CORPORATION by virtue of an assignment from the inventors recorded on February 12, 2001, at Reel 011521, Frames 0779-0780.

(ii) Related Appeals and Interferences

There are no other appeals and/or interferences related to this application.

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(iii) Status of the Claims

Claims 1-3, 5-7, 9 and 10 stand finally rejected by the Examiner. Claims 4, 8 and 11 have been cancelled.

(iv) Status of Amendments

There was one (1) Response filed on October 24, 2005, after final rejection of the claims on September 20, 2005, this Response having been considered by the Examiner.

(v) Summary Of Claimed Subject Matter

The subject invention relates to a method and apparatus for watermarking an information signal, and to a method and apparatus for detecting a watermark in such an information signal. Watermarking is performed on an information signal in order to determine authorized copies of the information signal as well as to control the copying of the information signal. However, static watermarking is subject to being defeated by hackers.

In order to provide a more secure method and apparatus for embedding an detecting a watermark, the subject invention contemplates associating different watermarks with distinct values of a property of the information signal. As such, the embedded watermark pattern changes from time to time, as a function of the information signal content.

In particular, claims 1 and 9 claim a method for embedding a watermark in an information signal, and an embedder, including "analyzing a given property of the information signal and determining an actual value of said property". This is shown in Fig. 1 and described in the Substitute Specification on page 5, lines 7-12, and in more detail on page 5, line 16 to page 6, line 6, in which an image analyzer 12 receives a video signal and analyzes a given property P of the video signal as a function of time.

In addition the embedding method of claim 1 (and the embedder of claim 9) includes "associating different sets of basic watermark patterns in a plurality of sets of basic watermark patterns with distinct values of said property, each set of basic watermark patterns being a combination of two or more basic watermark patterns", and "selecting the set of basic watermark patterns from said plurality of sets of basic watermark patterns associated with said actual value for embedding in the information signal". This is shown, in general, in Fig. 1, and described in the Substitute Specification on page 5, lines 12-15, in which a memory 14 has stored therein a plurality of watermark patterns, and a selector 13 selects one of the watermark patterns based on the value of property P supplied by the analyzer 12. More particularly, as shown in Fig. 5 and described in the Substitute Specification on page 9, lines 9-23,, the memory 14 has stored therein a plurality of sets

of basic watermark patterns, and the selector 13 selects one of the sets of basic watermark patterns based on the value of property P. In addition, the selected set of basic watermark patterns are applied to an encoder 16 which encodes a payload d into the relative positions of the basic watermark patterns, and a tiling circuit 17 which tiles the watermark pattern generated by the encoder 16 over the image.

Claim 5 claims a method for detecting a watermark in an information signal, while claim 10 claims a watermark detector, which correspond with the embedding method and embedder of claims 1 and 9. In particular, the detecting method includes "analyzing a give property of the information signal and determining an actual value of said property". This is shown in Figs. 2 and 6, and described in the Substitute Specification on page 6, lines 9-13, in which the detector 2 includes an image analyzer 22 which analyzes the same property P of the video signal as the image analyzer 12 of the encoder.

In addition, the detecting method and detector of claims 5 and 10 further include "associating different sets of basic watermark patterns in a plurality of sets of basic watermark patterns with distinct values of said property, each set of basic watermark patterns being a combination of two or more basic watermark patterns", and "selecting and detecting the set of basic watermark patterns from said plurality of sets of basic watermark patterns

associated with said actual value". This is shown in general and described in the Substitute Specification on page 6, line 7 to page 7, line 7, and more particularly, in Fig. 6 and described in the Substitute Specification on page 9, line 24 to page 10, line 7, in which a memory 24 stores a plurality of sets of basic watermark patterns, a selector 23 selects one of the sets of basic watermark patterns based on the value of property P, and a correlation circuit 21 which calculates the correlation between each image of the video signal and the selected set of basic watermark patterns.

(vi) Grounds of Rejection to be Reviewed on Appeal

(A) Whether the invention, as claimed in claims 1, 2, 5, 6, 9 and 10, is unpatentable, under 35 U.S.C. 103(a), over U.S. Patent 5,933,798 to Linnartz in view of U.S. Patent 6,222,932 to Rao et al.

(B) Whether the invention, as claimed in claims 3 and 7, is unpatentable, under 35 U.S.C. 103(a), over Linnartz in view of Rao et al., and further in view of U.S. Patent 5,260,648 to Brust.

(vii) Arguments

(A) The Linnartz patent discloses detecting a watermark embedded in an information signal, in which the embedding of a watermark is described with reference to Fig. 1 therein. In particular, "The

arrangement comprises a watermark data signal generator 11 which generates a predetermined watermark data signal wi(n) for each watermark Wi." (col. 2, lines 18-21). As described at col. 2, lines 15-18, "The watermark can be a code which uniquely identifies the owner of the copyright. It can also be a text string or simply a binary coded number. Accordingly, there is a finite set of different watermarks Wi." As should be apparent from examining Fig. 1, the particular watermark Wi used in watermarking the image signal p(n) is pre-selected and applied to the watermark data signal generator 11, which generates the associated watermark data signal which is added to the image signal p(n) in adder 12.

The Rao et al. patent discloses automatic adjustment of image watermark strength based on computed image texture, in which the texture in an image is computed, from a previously determined model relating watermark intensity to image texture, a watermark intensity is determined based on the computed texture, the intensity of a watermark is adjusted accordingly, and the image is watermarked with the intensity-adjusted watermark.

In the subject invention, as claimed in claims 1 and 9, a given property of the information signal to be watermarked is analyzed and an actual value of the given property is determined. In addition, different sets of basic watermark patterns in a plurality of sets of basic watermark patterns are associated with distinct values of the given property, each set of basic watermark

patterns being a combination of two or more basic watermark patterns. Finally, the set of basic watermark patterns from the plurality of sets of basic watermark patterns which is associated with the actual value of the property is selected for watermarking the information signal. A result of this is, over the course of time, the embedded set of basic watermark patterns changes, and as such, a plurality of sets of basic watermark patterns are used, depending on the actual value of the given property of the information signal.

This is shown in Figs. 5 and 6, and described in the Substitute Specification on page 9, line 9 to page 10, line 7 (paragraphs [0025]-[0026]), in which a selected set of basic watermark patterns (wherein each basic watermark pattern has a relatively small size) are tiled over the image.

Appellants submit that while Rao et al. discloses varying the intensity of a watermark based on image texture, which may arguably be deemed selecting one out of a plurality of watermarks, there is no disclosure or suggestion in Rao et al. that the plurality of watermarks is, in fact, a plurality of sets of basic watermark patterns, and that the selected watermark is one of the sets of basic watermark patterns, wherein the embedding process embeds the set of basic watermark patterns. This is described in the Substitute Specification on page 9, paragraph [0025] in which the

set of basic watermark patterns are tiled over the image by a tiling circuit.

In the Final Office Action, the Examiner states "Rao discloses calculating a texture value associated with the corresponding portion or several portions of the image. The portion(s) may be matrices of pixel values of the image, and the texture value may represent a measure of a base strength of the portion, or of other characteristics of the image content of the portion. Next, a watermark image is selected at step 204, and then parameters associated with a model for watermark strength, which use the texture values are retrieved at step 205 ... (Col. 5, lines 8-46). Therefore, Rao's disclosure applies different watermark patterns/strengths for watermaking different images."

Appellants submit that the main difference between Linnartz/Rao et al. and the subject invention is that Linnartz/Rao et al. selects a single watermark pattern/strength in dependence on the image parameter, while the subject invention selects, from a plurality of sets, a set of basic watermark patterns (each set including two or more basic watermark patterns) in dependence on the image parameter. This whole set of basic watermark patterns is then used to watermark the image, e.g., by tiling.

It should be noted that while an image (frame) has been used in the above description of the subject invention, the claims do not contain such a limitation. Hence, the selected set of basic

watermark patterns may be applied to a portion of an image, where the set of basic watermark patterns are, for example, tiled over the relevant portion of the image.

(B) The above arguments with respect to Linnartz and Rao et al. are incorporated herein.

Claim 3 includes the limitation "analyzing a shape of the frequency spectrum of said audio segments, each distinct shape of the frequency spectrum constituting a value of said property of the information signal", while claim 7 includes the limitation "analyzing a spatial or temporal distribution of luminance values, each distinct distribution of luminance values constituting a value of said property of the information signal".

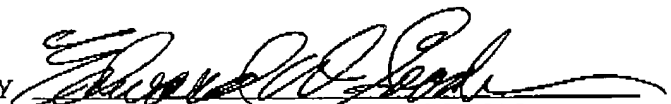
The Brust patent discloses a process and system for rapid analysis of the spectrum of a signal at one or several points of measuring, in which, arguably, the shape of a frequency spectrum of an audio signal is detected.

Appellants submit, however, that the combination of this feature with Linnartz and Rao et al. is meaningless with respect to the subject invention, in that neither Brust nor Linnartz nor Rao et al. disclose or suggest "associating different sets of basic watermark patterns in a plurality of sets of basic watermark patterns with distinct values of said property, each set of basic watermark patterns being a combination of two or more basic

watermark patterns", and "selecting the set of basic watermark patterns from said plurality of sets of basic watermark patterns associated with said actual value for embedding in the information signal".

Based on the above arguments, Appellants believe that the subject invention is not rendered obvious by the prior art and is patentable thereover. Therefore, Appellants respectfully request that this Board reverse the decisions of the Examiner and allow this application to pass on to issue.

Respectfully submitted,

by 
Edward W. Goodman, Reg. 28,613
Attorney

(viii) Appendix

CLAIMS ON APPEAL

1. (Previously Presented) A method of embedding a watermark in an information signal, comprising the steps:

analyzing a given property of the information signal and determining an actual value of said property;

associating different sets of basic watermark patterns in a plurality of sets of basic watermark patterns with distinct values of said property, each set of basic watermark patterns being a combination of two or more basic watermark patterns; and

selecting the set of basic watermark patterns from said plurality of sets of basic watermark patterns associated with said actual value for embedding in the information signal.

2. (Previously Presented) The method as claimed in claim 1, in which the information signal is a sequence of video images, and said analyzing step comprises:

analyzing a spatial or temporal distribution of luminance values, each distinct distribution of luminance values constituting a value of said property of the information signal.

3. (Previously Presented) The method as claimed in claim 1, in which the information signal is a sequence of audio signal segments, and said analyzing step comprises:

analyzing a shape of the frequency spectrum of said audio segments, each distinct shape of the frequency spectrum constituting a value of said property of the information signal.

4. (Cancelled).

5. (Previously Presented) A method of detecting a watermark in an information signal, comprising the steps:

analyzing a given property of the information signal and determining an actual value of said property;

associating different sets of basic watermark patterns in a plurality of sets of basic watermark patterns with distinct values of said property, each set of basic watermark patterns being a combination of two or more basic watermark patterns; and

selecting and detecting the set of basic watermark patterns from said plurality of sets of basic watermark patterns associated with said actual value.

6. (Previously Presented) The method as claimed in claim 5, in which the information signal is a sequence of video images, and said analyzing step comprises:

analyzing a spatial or temporal distribution of luminance values, each distinct distribution of luminance values constituting a value of said property of the information signal.

7. (Previously Presented) The method as claimed in claim 5, in which the information signal is a sequence of audio signal segments, and the method further comprises the step:

calculating the frequency spectrum for each segment, each distinct shape of said frequency spectrum constituting a value of said property of the information signal.

8. (Cancelled).

9. (Previously Presented) A watermark embedder for embedding a watermark in an information signal, comprising:

means for analyzing a given property of the information signal and determining an actual value of said property;

means for associating different sets of basic watermark patterns in a plurality of sets of basic watermark patterns with distinct values of said property, each set of basic watermark patterns being a combination of two or more basic watermark patterns; and

means for selecting the set of basic watermark patterns from said plurality of sets of basic watermark patterns associated with said actual value for embedding in the information signal.

10. (Previously Presented) A watermark detector for detecting a watermark in an information signal, comprising:

means for analyzing a given property of the information signal and determining an actual value of said property;

means for associating different sets of basic watermark patterns in a plurality of sets of basic watermark patterns with distinct values of said property, each set of basic watermark patterns being a combination of two or more basic watermark patterns; and

means for selecting and detecting the set of basic watermark patterns from said plurality of sets of basic watermark patterns associated with said actual value.

11. (Cancelled).

(ix) Evidence Appendix

There is no evidence which had been submitted under 37 C.F.R. 1.130, 1.131 or 1.132, or any other evidence entered by the Examiner and relied upon by Appellant in this Appeal.

(x) Related Proceedings Appendix

Since there were no proceedings identified in section (ii) herein, there are no decisions rendered by a court or the Board in any proceeding identified pursuant to paragraph (c)(1)(ii) of 37 C.F.R. 41.37.